REBUTTAL TESTIMONY OF
JAMES W. NEELY, P.E.
ON BEHALF OF
DOMINION ENERGY SOUTH CAROLINA, INC.
DOCKET NO. 2023-9-E

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND OCCUPATION.

A. My name is James W. Neely. My business address is 400 Otarre Parkway, Cayce, South Carolina 29033. I am employed by Dominion Energy Services, Inc. as an Energy Market Strategic Advisor for Dominion Energy South Carolina, Inc. ("DESC" or the "Company").

Q. ARE YOU THE SAME JAMES W. NEELY WHO PREVIOUSLY SUBMITTED DIRECT TESTIMONY IN THIS PROCEEDING?

A. Yes, I am.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. My rebuttal testimony is limited to addressing certain portions of the direct testimony of Witness Derek Stenclik, which was submitted on behalf of South Carolina Coastal Conservation League, and Southern Alliance for Clean Energy (collectively, "CCL/SACE") and Sierra Club, and certain portions of the direct testimony of Witness Philip Hayet, which was submitted on behalf of the South Carolina Office of Regulatory Staff ("ORS").

I do not raise any new issues for Commission consideration in my rebuttal testimony.

ORS TESTIMONY

Q. DO YOU AGREE WITH ORS WITNESS HAYET THAT DESC COMPLIED WITH IRP STATUTORY REQUIREMENTS AND COMPLIED WITH COMMISSION ORDER REQUIREMENTS?

A. Yes. DESC has carefully followed the requirements of the statute and applicable Commission orders in preparing this IRP which is based on sound planning assumptions and reasonable inputs, and reflects the best information available at the time it was prepared. I would respectfully ask the Commission to accept this IRP as filed so that planners at the Company can begin work in earnest on the 2024 IRP Update and can also concentrate on other work. The work includes the analyses necessary to complete plans to retire the Williams and Wateree coal units and replace them with resources that provide reliable, affordable and increasingly clean power to customers.

Q. ORS WITNESS HAYET INDICATES THAT DESC USED THE WRONG LOAD FORECAST FILES IN CALCULATING THE HIGH AND LOW DSM SENSITIVITIES. IS THAT CORRECT?

A. It is correct in part but not entirely. Only the Low DSM case used the incorrect load forecast file in optimizing a portfolio under this sensitivity. The High DSM load forecast was correct. See **Exhibit __ (JWN-1)** for the corrected version of the Build Plan and other affected tables modeled under the Low DSM Build Plan. In addition, the LNPV for the High DSM Build Plan was updated in **Exhibit __ (JWN-1)**, Table 56 to correctly include the DSM Cost of the High DSM Build Plan.

Q. DOES THIS CORRECTED VERSION OF THE LOW DSM BUILD PLAN IN ANY WAY CHANGE THE CONCLUSIONS OF THE IRP?

A. No. The only Build Plan impacted by the correction is the Low DSM Build Plan which was part of a sensitivity analysis and as such, it does not change anything in the Core Analysis of the IRP. The corrected version of the Low DSM Build Plan shows that relatively small changes in the plan are needed to serve the additional load caused by the lower DSM saving under the Low DSM forecast.

Q. ORS REQUESTS THAT DESC DISCUSS THE PROPOSED REGULATIONS RECENTLY ANNOUNCED UNDER THE CLEAN AIR ACT (“CAA”) SECTION 111 CONCERNING GREENHOUSE GAS (“GHG”) EMISSIONS FROM FOSSIL FUEL-FIRED ELECTRIC GENERATING UNITS. WHAT IS DESC’S RESPONSE?

A. DESC understands ORS’s concerns about the potential effect of new GHG regulations and is carefully monitoring the federal regulatory process for considering, amending and potentially adopting these new regulations. The likelihood of the eventual adoption and enforcement of these regulations in their current form depend on many factors, including the results of the present comment period, the assumption that the federal government will continue to pursue the policies of the current administration going forward and that the courts will find that the proposed regulations are a lawful exercise of regulatory authority under the CAA.

At present this is a proposed rule only, and is currently in its initial comment stage. The timing and precise provisions of any final rule remain uncertain. Company Witness Andrew Walker will discuss the proposed regulations in more detail in his rebuttal testimony.

Q. COULD THE PROPOSED REGULATION BE THE SUBJECT OF SENSITIVITY STUDIES IN A FUTURE IRP OR IRP UPDATE?

A. The proposed rule could be the basis for a sensitivity study in a future IRP or IRP update if circumstances at the time warrant. And as Witness Betty Best testifies, once an IRP has been created and filed, the appropriate way to update it is in the next IRP or in the annual update that follows closely on the conclusion of each triennial IRP. That would be the appropriate vehicle for any specific analysis of the impacts of the GHG rule.

Q. ORS ASKS DESC TO CONDUCT PRODUCTION COST MODEL BENCHMARK STUDIES ON AN ONGOING BASIS (ONCE EVERY 3

YEARS) AND DISCUSS WITH THE IRP STAKEHOLDER WORKING GROUP. WHAT IS THE COMPANY'S RESPONSE?

A. DESC is willing to conduct regular benchmarking of its production cost model against historical data as ORS requests and to discuss the results with the IRP stakeholder working group. We perform this benchmarking by running the production costs model using historical loads, outages and fuel prices and comparing the dispatch results to actual data. We then seek to identity anomalous results and to identify anomalous conditions on the system that may explain them. Where necessary, we make tweaks in the model to account for differences that are not otherwise explained. But it must be remembered that models are simplifications of the real world and can never fully account for the multitude of factors that affect the system in actual operation. So while regular informal benchmarking against historical results has value in determining the reasonableness of model results, benchmarking can only identify issues at a high level since many factors that affect the real time dispatch of the system are outside of the model.

ENVIRONMENTAL INTERVENORS

Q. THE ENVIRONMENTAL INTEVENORS (CCL/SACE AND THE SIERRA CLUB) QUESTIONS THE FACT THAT DESC HAS NOT MODELED A NON-FOSSIL FUEL ENERGY BUILD PLAN TO REPLACE WILLIAMS AND WATEREE. HOW DO YOU RESPOND?

A. Replacing Williams and Wateree with non-fossil resources means replacing the energy represented by these units with solar resources, which make a negligible contribution to capacity needs, and with battery technology to meet the capacity needs of the system which is an expensive and energy limited resource which must be recharged by other energy sources. As Company Witnesses Best, Walker and Scott Parker will testify, given the state of the technology today, replacing dispatchable firm resources with non-firm solar and energy-limited battery resources is not a viable and cost-effective way to build a reliable system.

In addition, when the PLEXOS optimization model created each of the build plans presented here, it was free to choose non-fossil resources whenever they were shown to be capable of optimally filling customers' needs for energy, capacity, and reserves reliably and economically. The build plans created by PLEXOS chose a significant level of non-emitting resources as part of the build plan in every portfolio and sensitivity modeled, in fact the majority of the capacity chosen was non-emitting. But PLEXOS also chose fossil resources in every portfolio and sensitivity modeled because under current and forecasted future conditions they are uniquely able to meet system needs economically and efficiently. That is because significant amounts of natural gas resources are needed to support the high levels of intermittent renewable resources added to the system.

The 70% CO_2 Reduction and the 85% CO_2 Reduction Build Plans specifically model the system to meet stringent CO_2 reduction goals by 2050. In both of these build plans, natural gas fired resources were required.

Q. THE ENVIRONMENTAL INTEVENORS SUGGEST THAT DESC SHOULD MODEL THE TRANSMISSION SYSTEM IN PLEXOS. IS IT APPROPRIATE TO MODEL THE TRANSMISSION SYSTEM IN PLEXOS?

A. No. The most logical way to model transmission as a component of generation planning is to do so as DESC does now by having generation planning identify future generation retirements and additions using PLEXOS and then having transmission planning model these major generation resource retirements and additions using the detailed power flow models which they maintain. As Witness Parker testifies, these power flow models contain detailed information about every major transmission asset on the system, as well as power flows into, out of and through adjoining systems and are updated continuously. They are designed to run studies that evaluate how these assets respond under specified conditions of customer load, available generation resources and available transmission resources. Power flow models identify situations in which specific lines or other assets exceed parameters and determine when needed improvements to the system are required to ensure reliability.

In contrast, PLEXOS models customer demands and generation resources over multiple decades to assess when new generation assets are required to meet customer demands and to select the most cost-effective resources to do so. These are two very different models with different uses and capabilities. While PLEXOS has capability to include some transmission features, it is not a load flow model like those used by transmission planning. The PLEXOS model evaluates multiple development paths for meeting customer's generation needs over decades and the number of variables it must account for already pushes the limits of computational resources. It cannot include the level of detail required for effective transmission planning.

Transmission modeling in PLEXOS would require significant modeling short cuts and simplifications to get the model to solve. Relatively few transmission variables could be included and some generation variables might need to be excluded. The results would be inferior to studies conducted by the transmission planning group using its model. Potentially contradictory results could be obtained by the two groups.

Witness Stenclik's testimony suggests using PLEXOS to model the transmission issues related to the retirement of the Williams Station. This would be particularly difficult and prone to error. As Witness Parker testifies, the transmission system serving the Charleston area is a complex network of interconnected lines owned by DESC and Santee Cooper. The transmission related issues created by retiring Williams are not simple enough to be modeled in PLEXOS.

The best approach to transmission modeling is to maintain the current separation between generation planning and transmission planning where each department relies on models designed and calibrated for its particular challenges, and the two groups use the results from the other's modeling in refining and completing their analyses.

Q. DO YOU AGREE WITH WITNESS STENCLIK THAT A 300 MW PER YEAR SOLAR LIMIT IS UNREASONABLE? (P. 18-22)

A. No. 300 MW per year solar limit is completely reasonable. Witness Stenclik admits that other utilities have annual limits on solar, and seeks to cast doubt on DESC's annual limit by comparing them specifically to Duke Energy's ("Duke") limits. But his comparison ignores the fact that DESC's system is much smaller than Duke's. Adjusting for size shows how generous DESC's limit is.

Witness Stenclik points to Duke's current 750 MW limit and possible limit of 1,250 MW that Witness Stenclik says Duke is considering as reasons that the 300 MW limit is not reasonable for DESC. But for the Duke system, 750 MW only amounts to 2.5% of peak load. For the DESC system, 300 MW is approximately 6% of peak load. Even the 1,250 MW limit proposed on the Duke system amounts to only 4% of Duke's peak. Southern Company imposes a 1,500 MW annual solar build limit which is 5% of their peak. On a comparative basis, an annual limit of 6%

of system peak is completely appropriate and reasonable on DESC's system and, exceeds the limits imposed by its adjoining utilities. In addition, as pointed out in my earlier testimony, the 300 MW limit is fully consistent with the annual amount of solar that was being built on DESC's system in recent years when avoided costs supported a robust solar build.

The goal of generation planning is to plan based on reasonable assumptions of what resources can be added to the system and when. It would be unreasonable to assume, as Witness Stenclik suggests, that battery and solar resources can be added in quantities that exceed historical and regionally accepted limits.

Q. DO YOU AGREE WITH WITNESS STENCLIK THAT AN AVERAGE CAPACITY FACTOR OF 23.5% FOR SOLAR IS UNREASONABLE? (P. 22)

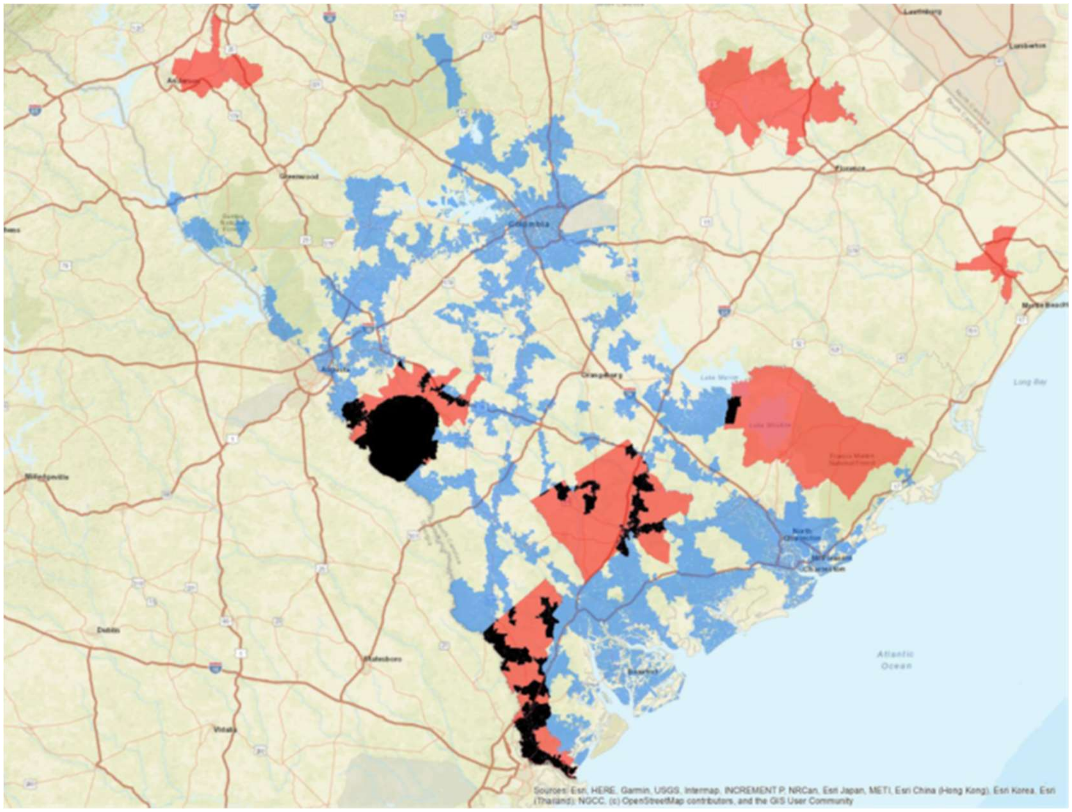
A. No, and there is a simple reason it is not. The 23.5% capacity factor is appropriate because the DESC IRP model doesn't incorporate annual degradation for solar which amounts to about 0.5% per year. The 23.5% solar capacity factor is based on actual solar farms on the DESC system. In addition, the 2022 NREL ATB shows similar capacity factors over the next 10 years ranging from 23.1% to 24.9%. DESC's 23.5% capacity factor is well within that range.

Q. DO YOU AGREE WITH WITNESS STENCLIK THAT A 50/50 SPLIT BETWEEN UTILITY SELF-BUILD AND PPA SOLAR RESOURCES IS UNREASONABLE? (P. 8, 59, 79)

A. No. Utility self-build is an important component of an integrated utility operating its system reliably and efficiently. Any renewable package needs to include a minimum amount of utility owned capacity for DESC to fulfill its requirements as a "system operator" which includes backstopping third party resources and making sure that renewable assets are coordinated with transmission assets to get the energy to the areas with load. Developer-selected renewable sites do not necessarily address system-wide transmission issues. Rather than rely upon a single type of ownership for solar resources to provide power to the Company's customers, it is reasonable to rely upon a diversified portfolio that includes both the utility and solar developer projects.

Q. WITNESS STENCLIK TESTIFIES THAT "A LARGE PORTION OF THE STATE, AND PARTICULARLY DESC'S SERVICE TERRITORY, IS AVAILABLE FOR [ENERGY COMMUNITY] BONUS CREDITS" UNDER THE IRA? (P. 30, LINE 11). DO YOU AGREE?

A. No. The Department of the Treasury has recently released a list of the census tracts that qualify as energy communities under the IRA. The energy communities that intersect with DESC's service territory are quite small, as shown by the black areas on the map below. The largest area, located on the west side of the state along the Savannah River, is located in the Savannah River Site which is a highly restricted DOE site. In addition, the retirement of Wateree and Williams could anchor energy communities in their census tracts, but these would be incremental additions to the total available areas.



Q. DO YOU AGREE WITH WITNESS STENCLIK THAT ALL BATTERY AND MANY SOLAR RESOURCES SHOULD INCLUDE A 10% ENERGY COMMUNITIES BONUS CREDIT UNDER THE IRA? (P. 29)

A. No. In his analysis, Witness Stenclik assumes that 100% of new battery resources and 1,200 MW of new solar resources will be located in energy communities and receive a 10% bonus credit. Given the limited area with DESC's territory that qualify as energy communities, it's unreasonable to assume that more than a limited fraction of the solar and battery resources, will be able to access the energy community bonus. For planning purposes, it is more accurate to assume that none of the generic solar and battery resource modeled in the IRP will have access to these areas, since the accessible area is so small. To do otherwise would unreasonably bias the analysis toward solar and battery. This is a matter that DESC has discussed with stakeholders following the release of the Treasury Department census tract information. DESC is willing to continue that discussion and consider proposals for modifying this analysis in future IRPs or IRP updates.

Q. DO YOU AGREE WITH WITNESS STENCLIK THAT IT IS UNREASONABLE TO SUNSET THE PROVISIONS OF THE IRA AT THE END OF THE PROGRAM? (P. 33)

A. No. Witness Stenclik assumes that the full level of IRA incentives will be available for renewable and battery resources until 2050. That assumption is inconsistent with the fact that such incentives are intended to be transitional, and a sunset provision is included in the IRA legislation for that reason. The assumption that the IRA will not sunset on the primary sunset date contained in the legislation is speculative. It assumes the nation will not reduce its CO_2 emissions levels to the level required for sunset to proceed as the act currently provides or that the act will not be changed in the interim to definitively require sunset on the current sunset date. Both are optimistic assumptions that can result in misleading conclusions for planning purposes. In addition, modeling IRA benefits past the sunset date risks over accounting for the incentives, positive and negative, that are driving the transition to non-emitting resources. By 2030 the Reference Market Scenario assumes the nation will impose significant CO_2 costs in the form of taxes or other limits on CO_2 emissions. Those costs are included in the Reference Build Plan and all but one of the remaining four Core Build Plans. Even higher CO_2 costs are assumed beginning in 2028 under the Aggressive Regulation Build Plan. To assume both IRA subsidies and significant CO_2 costs during the period after 2035 is not a reasonable planning assumption.

Q. DO YOU AGREE WITH WITNESS STENCLIK THAT DESC USED THE WRONG HEAT RATES FOR NEW GAS RESOURCES? (P. 36)

A. Yes. There was an error in selecting the heat rate for certain new gas resources. The manufacturers provided two heat rate factors, and the lower heat rate factor was chosen, which was not the appropriate factor for this purpose.

Q. DO YOU AGREE WITH WITNESS STENCLIK THAT THE HEAT RATE ISSUE IS SIGNIFICANT, AND THE HEAT RATES USED ARE MUCH LOWER THAN THE CORRECT ONES? (P. 36)

A. No. This is not an issue that changes the determination that the Reference Build Plan is the Preferred Build Plan or materially changes the near to medium term decisions that must be made to support retirement and replacement of Wateree or Williams. As Witness Stenclik states, the difference in heat rate is only about 11% for new combined cycle and combustion turbine units. The only variable this affects is fuel cost. But fuel is only one component of the total cost of a new gas generating unit. The capital cost to build the unit and the fixed and variable O&M cost to run it are major costs as well. When you take these costs together, an 11% change in fuel cost results in a 4.3% average increase in the new combined cycle annual costs and only a 0.56% increase in the LNPV of the Reference Case. These changes would not effect the model's selection of the new combine cycle resource. This is an issue that DESC will correct in the 2024 IRP Update. It does not affect the overall validity of the IRP as filed.

Q. IS THE HEAT RATE ISSUE RAISED HERE THE SAME ONE THAT WAS POINTED OUT IN THE 2021 IRP UPDATE AS WITNESS STENCLIK IMPLIES? (P. 36)

A. No. The problem in the 2021 IRP Update was related to PLEXOS using the heat rates in an unusual manner that was inherent in the PLEXOS software which had recently been implemented. This issue is entirely different and relates only to new fossil fuel resources and was addressed in the model.

Q. AS TO COMBINED CYCLE UNITS, DO YOU AGREE WITH WITNESS STENCLIK THAT THE MINIMUM UP AND DOWN TIME ASSUMPTIONS FOR GAS RESOURCES RESULT IN A DISPATCH THAT IS UNREALISTIC? (P. 38)

A. No. Just the opposite. The minimum up and down times he modeled in his analysis are unrealistic. As Witness Walker testifies, as a planning or a daily dispatch assumption, it is not prudent to plan to run these units at the levels Witness Stenclik assumes. To operate these units with these short cycle times would result in high levels of thermal stress, expensive additional maintenance costs and potential long-term reliability issues. None of these additional costs are included in Witness Stenclik's analysis. The longer minimum up and down times assumed in the PLEXOS model reflect how existing units are operated today. To assume otherwise is not a reasonable planning assumption.

Q. AS TO NEW COMBUSTION TURBINES, DO YOU AGREE WITH WITNESS STENCLIK THAT DESC MODELED MINIMUM UP AND DOWN TIMES THAT WERE TOO LONG? (P. 38)

A. No. Witness Stenclik conflates the run times of aeroderivative CTs, which play a relatively small part in the generation plans presented here, with Frame CTs which are very different units. Areoderivative CTs were modeled with a 1 hour up and down time, which they are designed to support, and which corresponds to Witness Stenclik's suggestions. The Frame CTs are larger units that are not designed with the same short run times as aeroderivative CTs. Frame CTs were appropriately modeled with a minimum up time of 2 hours and minimum down time of 4 hours, which is how these types of units are expected to be operated. As is the case with combined cycle units, to operate them as Witness Stenclik suggests would increase thermal loading, create unnecessary wear and tear on the units and increase maintenance costs, costs which he does not account for in his analysis. The run times that DESC has assumed for CTs are entirely appropriate.

Q. THE 2021 TRANSMISSION IMPACT ANALYSIS ("TIA") DETERMINED THAT A $309 MILLION TRANSMISSION INVESTMENT WAS REQUIRED TO SUPPORT THE RETIEMENT OF WILLIAMS. DO YOU AGREE WITH WITNESS STENCLIK THAT STRATEGICALLY LOCATED STANDALONE STORAGE, DEMAND RESPONSE, AND DISTRIBUTED ENERGY RESOURCES COULD OFFSET THIS INVESTMENT? (P. 40)

A. The 2022 TIA evaluated standalone storage at Williams and battery costs aside, found that as a technical matter some level of battery resources could offset part of the transmission investment required to replace Williams. But replacing Williams entirely with on-site battery is not an effective transmission or reliability solution. As Witnesses Walker and Parker testify, that conclusion is supported by the transmission constraints in the Charleston area and the lack of generation to recharge batteries. Setting aside the expense of batteries, they must be recharged. Where will the power come from and how will it be imported into the Charleston area? By necessity, the batteries cannot be on line when recharging, and while they are recharging the limited transmission capacity in the area will have to both serve the area load and transmit the power needed for battery recharge.

The $309 million estimate of the cost to replace Williams already assumes a favorable and practical location for the replacement generation. Specifically, the $309 million transmission cost represents the transmission cost required to locate replacement resources at the Canady's site which is only forty miles from Williams, has existing transmission assets on site which feed directly into the Charleston load center, requires no new transmission right of way, and is approximately ten miles from a principal switchyard serving the Charleston area and the Low Country in general. As Witness Parker testifies, the $309 million is a very favorable estimate of the cost to retire Williams assuming a highly favorable location for the replacement.

Q. WITNESS STENCLIK FAULTS DESC FOR NOT EVALUATING PORTFOLIOS THAT DID NOT INCLUDE FOSSIL RESOURCES AND ARGUES THAT THIS REPRESENTS A GAS BIAS ON THE PART OF DESC. DO YOU AGREE? (P. 43)

A. No. DESC did not limit the portfolios that PLEXOS could create nor did it require PLEXOS to include gas resources in any portfolio it created. If portfolios with only new solar and battery resources would have served customers' needs economically and reliably, PLEXOS would have selected them under its optimization function. It did not for reasons we have explained concerning the costs and limitations of those technologies.

In the 2020 IRP proceeding, intervenors argued about the superiority and objectivity of resource optimization modeling and in Order No. 2020-832 (pp. 25-28) the Commission ordered DESC to use that approach in future IRPs. The Environmental Intervenors now complain that the optimization modeling that they advocated in past proceedings did not pick their preferred resources to the exclusion of fossil resources, even under aggressive carbon cost assumptions, and seek to force the creation of portfolios that meet their expectations.

Q. DO YOU AGREE THAT ASSIGNING GAS CAPACITY FULL CAPACITY FOR RESERVE MARGIN CALCULATIONS INDICATES A GAS BIAS ON THE PART OF DESC? (P. 44)

A. No. Company Witness Nick Wintermantel addresses the ELCC analysis in his rebuttal testimony and describes how solar, storage and gas resources are analyzed on an equal basis. There is no gas bias in PLEXOS. In fact, there is a pro-solar and battery bias at play here because neither solar nor battery resources are given a forced outage rate in the PLEXOS analysis, as are fossil resources, although both experience forced outages.

Q. DO YOU AGREE WITH WITNESS STENCLIK'S ASSERTION THAT THE REFERENCE PLAN DOES NOT HAVE A DIVERSE RESOURCE MIX? (P. 45)

A. No. Witness Stenclik's observation concerning generation diversity only considers one year immediately following construction of new combined cycle

("CC") capacity. Over the full planning period, the Reference Build Plan adds 5,025 MW of new solar, 1,600 MW of new storage, 1,708 MW of new gas. Using annual energy as the metric, in 2050 the energy mix of new resources in the Reference Build Plan is 8% new battery, 62% new solar and 32% new gas. Even when only 2031 is considered there is still a diverse mix of new resources with 6% battery, 41% solar and 53% new gas, not 60% new gas as witness Stenclik claims.

Q. DO YOU AGREE WITH WITNESS STENCLIK THAT DESC'S MEASURE OF RESOURCE DIVERSITY IS MISLEADING BY USING NAMEPLATE CAPACITY?

A. No. I believe nameplate capacity is an appropriate measure of generation diversity and is in no sense misleading. ELCC measures an important but very limited part of the contribution that an asset makes to the reserve margin. On the other hand, nameplate capacity is a measure of the utility's investment in capacity that is available to serve customers year in and year out, and is an appropriate measure of diversity. I would note that the IRP measures fuel diversity, fuel cost, and CO_2 emissions directly for each of the Core Build Plans.

Q. DO YOU AGREE WITH WITNESS STENCLIK THAT BUILDING 662 MW OF CC POSES UNACCOUNTED FOR RISKS TO DESC RATEPAYERS? (P. 46)

A. Actually, the greater risk is not building this or a similar dispatchable resource that provides firm capacity and energy. The risk that load doesn't materialize is not nearly as great as the risk that load materializes faster and greater than forecast, and the consequences to customers and to the economy of the state are worse. The Company must prepare for higher load growth from electrification and the rapid adoption electric vehicles ("EVs"). Relying too heavily on solar also poses risks for customers. What happens during weeks when there is no significant sunshine? There is no way to switch solar panels to some back up fuel. This is why a diverse portfolio, like the one in the Reference Build Plan, is important.

Q. DO YOU AGREE WITH WITNESS STENCLIK THAT RESOURCES LIKE SOLAR AND STORAGE CAN REPLACE GAS RESOURCES LIKE THE SHARED CC MODELED IN THE 2023 IRP? (P. 48)

A. No. Building out of gas resources is necessary to add solar and storage. Solar and storage alone do not provide the energy, capacity, dispatchability, reserves and other ancillary services needed to build a reliable system. The need for new resources is being caused by the plan to retire coal resources that provide energy, capacity, dispatchability, reserves and other ancillary services.

Q. DO YOU AGREE WITH WITNESS STENCLIK THAT DESC WOULD BE STAKING THE FEASIBILITY OF COAL RETIREMENTS AND, POTENTIALLY, THE FUTURE RELIABILITY OF ITS GRID, ON A SINGLE, HIGH STAKES PROJECT? (P. 48)

A. No. A new shared CC is just one component of the plan and can be pursued with Santee Cooper in a shared project or independently. Over the planning horizon, most of the new energy to serve DESC's customers comes from solar and much of the new capacity comes from battery storage. A CC unit, whether built with Santee Cooper or not, represents mature technology with established suppliers, known costs, known operating characteristics and skilled and experienced contractors ready to undertake construction. At the Canadys site, the natural gas to fuel a CC unit can be delivered using existing pipeline rights of way. This is a brownfield site that DESC owns and has used for electric generation purposes over past decades. It is a current utility asset and is well understood environmentally. Siting known technology there represents manageable if not low risks to the future reliability of the grid, and certainly that is true compared to reliance on solar and battery to replace Williams.

Q. HOW DO YOU RESPOND TO THE INFERENCE THAT OUTAGES OF NEW GAS RESOURCES ARE MUCH MORE LIKELY TO OCCUR DURING EXTREME WINTER CONDITIONS? (P. 54)

A. Historical data on DESC's system does not indicate a correlation between cold weather and forced outages. More to the point, as Witness Walker will testify, the new gas fired generation units that DESC would purchase will be fully winterized by design and as constructed. Such units function reliably in conditions far colder than can be expected in South Carolina. There is no substance to the claim that new gas resources could be expected to be subject to higher levels of winter outages.

Q. PLEASE DESCRIBE THE SCENARIOS MODELED BY WITNESS STENCLIK IN THIS ANALYSIS.

A. Witness Stenclik modeled four different scenarios using DESC's reference load, medium fuel and medium CO_2 forecasts. The following changes were implanted for all scenarios modeled by Witness Stenclik: (1) solar build costs changed to PPA only; (2) battery resource FO&M costs were changed to the 4-hour storage; (3) the 4-hour storage WACC was changed from 14.55% to 13.12%; (4) the life of battery resources was extended from 20 years to 25 years; (5) IRA bonus credits of 10% were applied to 1,200 MW of solar and 10% bonus to all storage resources; (6) thermal heat rates were changed to HHV instead of LHV; (7) existing CC operating constraints were lowered to 6 hours up and 8 hours of down time; (8) new Frame CTs operating constraints were lowered to 1 hour up and 1 hour down.

The first scenario was based on DESC's Preferred Build Plan ("DESC Preferred Plan, Adjusted") but makes the eight changes listed above. The other three scenarios evaluate two different retirement options for Williams and also added the following changes: (1) increased annual solar limit from 300 MW/year to 600-750 MW/year; (2) increased the total solar build limit from 5,025 MW to 7,500 MW; (3) made 50% ELCC 4-hour storage available in 2026; (4) made 600 MW of 8-hour storage available in 2026; (5) made new thermal combustion turbin ("CT") units available after 2026; (6) changed the planning horizon from a single 28-year block to four 7-year blocks with rolling horizon; and (7) changed the chronology fitting from partial to fitted. The second scenario modeled a non-fossil fuel replacement for Wateree and Williams by 2029 ("Alt Coal, 2029"), the third scenario adjusts the Williams coal retirement date to 12/31/2030 to compare with DESC's timeline ("Alt Coal, 2031"), and the fourth scenario was the same as Alt Coal, 2029 but increased energy efficiency measures and shifted 400 MW of 4-hr storage to 8-hr storage beginning in 2029 ("Alt Coal, 2029 + ER").

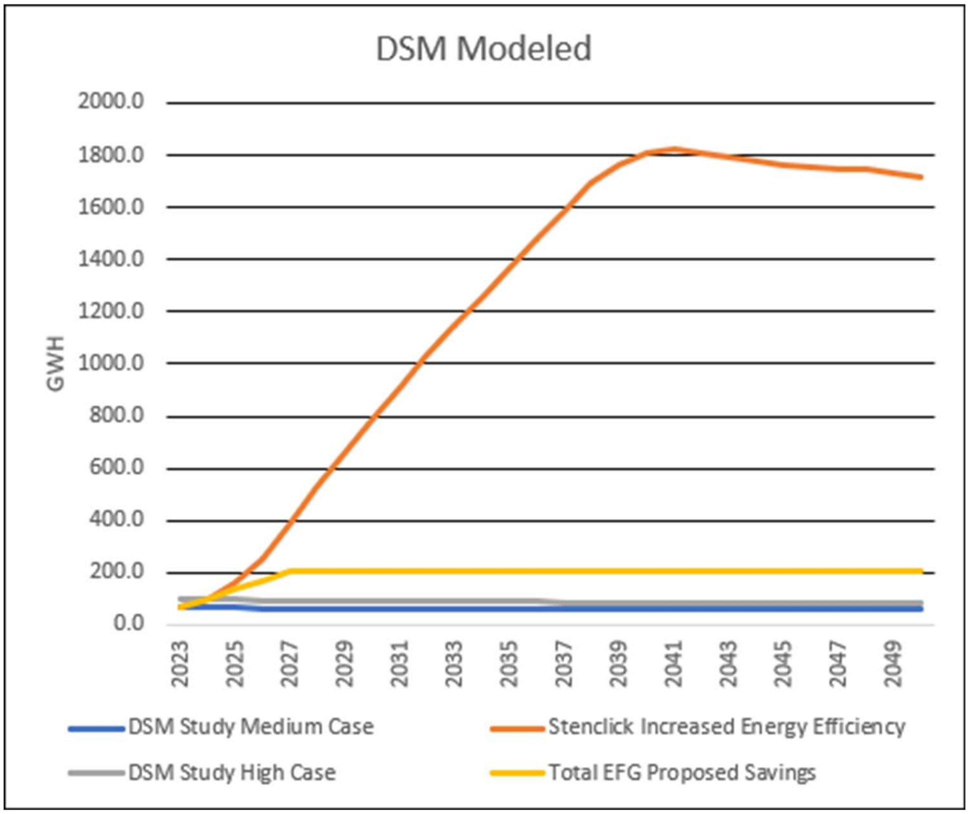
Q. IN HIS THREE ALTERNATIVE PORTFOLIO ANALYSES WITNESS STENCICK PURPORTS TO SHOW THAT DESC COULD REPLACE WILLIAMS WITH SOLAR AND STORAGE ONLY. ARE THE BATTERY COSTS MODELED BY WITNESS STENCLIK IN THIS ANALYSIS REASONABLE? (P. 55)

A. No. Setting aside other issues with this analysis, Witness Stenclik adopts overly aggressive assumptions concerning the cost and availability of battery storage to achieve his results. He based his analysis on 2022 NREL battery costs which DESC adopted based on stakeholder suggestions but which DESC has previously indicated it believed to be unreasonably low. NREL has now determined that the battery storage costs that they provided in 2022 are 45% too low on a nominal basis. Witness Stenclik, however, reduced those prices by an additional 10% assuming availability of the IRA energy community bonus credit, which as I indicated above is not reasonable. Witness Stenclik also combined unrealistic storage prices with increased availability of storage requiring a massive storage build in one year, making his modeling results unsupportable. Witness Stenclik also made a number of other assumptions in his analysis that are not reasonable. In as much as Witness Stenclik's alternative replacements for Williams rely almost entirely on battery resources for capacity, his reduction of battery costs that were already too low make his analysis meaningless as a practical matter.

Q. ARE THE DSM LEVELS MODELED BY STENCLIK IN HIS ALT COAL 2029 + ER PORTFOLIO ANALYSIS REASONABLE?

A. No. This is the second fundamental problem in Witness Stenclik's analysis. The reductions in load that Witness Stenclik modeled from DSM in his Alt Coal 2029 + ER Portfolio are 30 times higher than the medium DSM case supported by the 2023 DSM Potential Study, 20 times higher than the DESC High DSM case, and nine times higher that the Environmental Intervenors' own witness, Witness Jim Grevatt, proposed. These DSM assumptions are fundamentally at odds with the 2023 DSM Potential Study performed by ICF and filed in this docket. The Commission has ordered the Company to ensure that DSM programs are cost effective, reasonable and achievable. Witness Stenclik's alternative portfolios rest on assumed DSM demand reductions which cannot be shown to meet any of those criteria.

The degree to which the DSM values modeled by Witness Stenclik are also not supported by the Environmental Intervenors' Witness Grevatt are shown on the chart below by the yellow line labeled total EFG proposed savings. Witness Stenclik's orange line is orders of magnitude greater. No explanation is given.



Q. IS THERE ALSO A PROBLEM IN HOW WITNESS STENCLIK MODELED DSM COSTS IN HIS ALT COAL 2029 + ER PORTFOLIO ANALYSIS?

A. Yes. Witness Stenclik added additional DSM costs to his analysis based on Witness Grevatt's testimony, but the DSM reduction in Witness Stenclik's model are nine times greater. All other problems with this analysis aside, it is unreasonable to assume a nine-fold increase in DSM load reductions with no change in DSM program costs. Another issue is Witness Stenclik's grouping the DSM costs into the fixed cost bucket when most of the DSM costs are incentive costs which are variable. If Witness Stenclik had included additional DSM costs consistent with the DSM load reductions he assumed in his analysis, then the LNPV of his reliability case (Alt. Coal 2029 + ER) would have been $2,246,079 ($000) which is 19% more expensive than the DESC Preferred Plan, and 23% more expensive that Witness Stenclik's DESC Adjusted Portfolio, not 0.26% less as claimed by Witness Stenclik. Even this is a conservative estimate of DSM costs, because it is not reasonable to assume that DSM costs would remain constant on a per kWh savings basis under the kind of programs posited to achieve savings at these inflated levels.

Q. ARE THERE ANY OTHER ISSUES WITH THE MODELING PERFORMED BY WITNESS STENCLIK?

A. A number of the issues I discussed earlier apply specifically to Witness Stenclik's three alternative portfolio analyses. In all three alternative portfolio analyses, Witness Stenclik assumed high storage availability in combination with unrealistic storage prices making his modeling results effectively useless. Witness Stenclik's annual solar and battery limits are unreasonable when compared to other utilities and DESC's own solar build history. Applying the energy community bonus credit to 1200 MW of solar and 2100 MW of battery storage was also unrealistic. Witness Stenclik also achieved his results by modifying the minimum up and down times for Frame CT and CC units, which are themselves unrealistic. As I have previously testified, this would cause increased maintenance cost, but no additional maintenance costs were added. Other inappropriate cost reducing assumptions include making all solar resources PPA resources and increasing the annual solar build limit to values that are not appropriate for a system the size of DESC. Witness Stenclik's 8-hour batteries were given a 100% ELCC value which is inappropriate for DESC which already has 576 MW of storage on its system, in the form of the Fairfield Pump Storage facility, with an additional 33.5 MW of storage under contract. These are all adjustments to the model input that unreasonably favor solar and battery resources and disfavor gas.

Q. EVEN WITH THESE FLAWS IN HIS ANALYSIS, WHICH CREATE A SERIOUS BIAS AGAINST ADDITIONAL GAS GENERATION, WOULD WITNESS STENCLIK'S ALTERNATIVE PORTFOLIO ANALYSES HAVE RESULTED IN AN OPTIMIZED PORTFOLIO THAT DOES NOT INCLUDE THE CC UNIT TO REPLACE WILLIAMS?

A. No. Even making the unsupportable assumptions he made, and omitting the costs he omitted, Witness Stenclik's resource optimization model would have chosen to construct a 2x1 CC in 2031 to replace Williams if he had not eliminated that as an option in PLEXOS.

Q. HAVE YOU VERIFIED THAT WITNESS STENCLIK'S ANALYSIS WOULD HAVE CHOSEN A CC RESOURCE IN 2031 WITHOUT THIS CONSTRAINT?

A. Yes. I reran his analysis without this constraint and using his inputs. This analysis chose to build the 2x1 CC unit in 2031.

Q. DID DESC INCORRECTLY INTERPRET THE STAKEHOLDERS "REQUEST THAT THE COMMISSION ORDER THE COMPANY TO SUBMIT A BUILD PLAN THAT CONSISTS OF 100% CLEAN ENERGY RESOURCES"? (P. 61)

A. No. DESC understood the request to be a portfolio of 100% ***new*** clean energy resources. That is what is meant by the term "build plan," which is a plan for building ***new*** generation resources. We understood the Environmental Intervenors' request to be a request that DESC force the model to run a clean energy only build plan. We believed that request to be as unreasonable then as we do now. Instead, we created build plans to achieve 70% and 85% reductions in CO_2 by 2050, and to test the results of our modeling against high CO_2 costs. All three chose natural gas fired resources to ensure reliable and economical service to customers.

Q. DO YOU AGREE WITH WITNESS STENCLIK'S OBSERVATION THAT IN 2050, SOLAR GENERATION ACCOUNTS FOR 27% OF ANNUAL GENERATION AND GAS GENERATION STILL ACCOUNTS FOR 63% AND THAT GAS ACCOUNTS FOR 60% OF ALL GENERATION IN 2031? (P. 62)

A. No. His quoted values are close but inaccurate. When citing the DESC results he consistently rounds up the gas value and rounds down the solar values, which supports his renewables bias. Solar accounts for 30%, not 27%, and gas accounts for 53% of 2050, not 63%, generation in the Reference Build Plan. Solar accounts for 21% and gas accounts for 56%, not 60%, of 2031 generation in the Reference Build Plan.

Q. HAVE YOU IDENTIFIED SPECIFIC PROBLEMS WITH TABLES 7 AND 8 ON PAGES 64 AND 65 OF WITNESS STENCLIK'S TESTIMONY?

A. Yes. In addition to the problems with the analysis and inputs discussed above, the values in Tables 7 and 8 of Witness Stenclik's testimony do not match the results that he provided us. The 2050 CO_2 values from Witness Stenclik's model runs are not as significant as he indicates in his Table 7. His NPV data in Table 8 are also inconsistent with his analysis. I have attached adjusted tables at **Exhibit __ (JWN-2).**

Q. WHAT OTHER CONCERNS TO YOU HAVE FOR WITNESS STENCLIK'S ALTERNATIVE PORTFOLIOS? (P. 70)

A. My primary concern is reliability. Replacing retiring coal with solar and storage will not provide for the reliability needs that customers expect and that DESC is committed to provide. DESC's Reference Build Plan adds significant amounts of solar (5025 MW) and storage (1600 MW) but does it without compromising reliability. Solar and storage limits included in DESC's Preferred Build Plan are not arbitrary but enable a reasonable and prudent addition of resources.

Q. WHAT CONCLUSIONS HAVE YOU REACHED BASED ON YOUR ANALYSIS OF WITNESS STENCLIK'S TESTIMONY AND ANALYSIS?

A. Witness Stenclik's analysis of his alternative portfolios is based on assumptions that are demonstrably incorrect as to costs of battery resources, operating constraints of gas resources, among other flaws. His Alt Coal 2029 plan is based on the unreasonable assumption that the transmission infrastructure improvements to support retiring the William unit can be completed by that date. His ultimate plan, the Alt Coal 2029 + ER Plan, is based on inflated DSM load reductions that are orders of magnitude higher than can reasonably be forecasted and suffer from equally as serious underestimates of the costs of these hypothetical level of savings. But even with these errors, Witness Stenlick's portfolio optimization would result in the selection of a CC unit to replace Williams but for his decision to instruct the program not to do so. With these errors corrected, Witness Stenlick's analyses supports the conclusions of the IRP, specifically that a CC unit is the appropriate replacement for Williams.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes, it does.

Table 56: DSM Build Plan Sensitivities, LNPV of Costs and Retail CAGR Compared Under the Reference Market Scenario

DSM Sensitivities LNPV ($M); CAGR %					
DSM Sensitivity Build Plans	**30-Year LNPV**	**Difference in 30 Year LNPV**	**Percentage Difference**	**Retail CAGR over 15 Years**	**Percentage Difference**
Medium DSM	$1,884	$0	0	1.47%	0
High DSM	$1,877	($6)	-0.3%	1.47%	0.00%
Low DSM	$1,889	$5	0.27%	1.39%	-0.07%

Table 57: DSM Sensitivities, Cumulative and 2050 CO2 Emissions Compared Under the Reference Market Scenario

DSM Sensitivity Build Plans (M short tons)					
DSM Sensitivity Build Plans	**30-Year Cumulative Emissions**	**Difference from Reference**	**Percentage Difference**	**2050 Emissions**	**Percentage Difference**
Medium DSM	202,714	0	0	7,758	0
High DSM	200,369	(2346)	-1.16%	7,630	-1.66%
Low DSM	205,099	2385	1.18%	7,626	-1.71%

Appendix F: Generation Added by Type for each Resource Plan by Year

LowDSM Build Plan																
Year	1x1 CC	2x1 CC 50% Shared	2x1 CC	3x1 CC	CT Aero 1x	CT Aero 2x	CT Frame 1x	CT Frame 2x	SMR	Solar	Solar IRA	Solar PPA	Solar PPA IRA	Off Shore WInd	Battery 85%	Battery 50%
2023																
2024																
2025																
2026													150			
2027											75		150			
2028											150		150			
2029											150		150		400	
2030											150		150			
2031		662									150		150			
2032											150		150			
2033											150		150		100	
2034											150		150		300	
2035											150		150			
2036										150		150				100
2037												150				
2038								523				150				
2039												150				
2040												150				
2041												150				
2042												150				
2043												150				
2044								523				150				
2045												150				
2046												150				
2047												150				
2048												150				
2049												150				500
2050																200
Total MW		662						1046		150	1275	2100	1500		800	800

Appendix E: Timing and Nature of Resource Additions and Resulting Capacities and Reserve Margins

Low DSM Build Plan										
Year	**Peak (MW)**	**Firm Capacity (MW)**	**Winter Reserve Margin (%)**	**New Gas (MW)**	**New Solar (MW)**	**New Storage (MW)**	**New Wind (MW)**	**New SMR (MW)**	**Retirements (MW)**
2023	4903	6305	28.6	0	0	0	0	0	0
2024	4777	6282	31.5	0	0	0	0	0	0
2025	4816	6277	30.3	0	0	0	0	0	0
2026	4854	6328	30.4	0	150	0	0	0	0
2027	4896	6339	29.5	0	225	0	0	0	0
2028	4937	6356	28.7	0	300	0	0	0	0
2029	4978	6033	21.2	0	300	400	0	0	-684
2030	5018	6057	20.7	0	300	0	0	0	0
2031	5057	6131	21.2	662	300	0	0	0	-610
2032	5101	6147	20.5	0	300	0	0	0	0
2033	5144	6207	20.7	0	300	100	0	0	0
2034	5190	6469	24.6	0	300	300	0	0	0
2035	5239	6475	23.6	0	300	0	0	0	0
2036	5287	6529	23.5	0	300	100	0	0	0
2037	5346	6532	22.2	0	150	0	0	0	0
2038	5403	6921	28.1	523	150	0	0	0	0
2039	5463	6922	26.7	0	150	0	0	0	0
2040	5522	6919	25.3	0	150	0	0	0	0
2041	5584	6917	23.9	0	150	0	0	0	0
2042	5647	6919	22.5	0	150	0	0	0	0
2043	5711	6920	21.2	0	150	0	0	0	0
2044	5775	7445	28.9	523	150	0	0	0	0
2045	5840	7446	27.5	0	150	0	0	0	0
2046	5906	7449	26.1	0	150	0	0	0	0
2047	5973	7451	24.7	0	150	0	0	0	0
2048	6040	7453	23.4	0	150	0	0	0	0
2049	6108	7364	20.6	0	150	500	0	0	0
2050	6177	7465	20.9	0	0	200	0	0	0

Exhibit __ (JWN-2)

<u>Testimony of Witness Stenclik</u>
<u>Corrected Tables 7 and 8 from his Direct Testimony</u>

Table 7:

Year	Year DESC Preferred	Alt. Coal 2029	Alt. Coal 2031	Alt. Coal 2029 + ER
2023	9,500	9,500	9,500	9,500
2031	5,991 (-37%)	4,873 (-49%)	5,087 (-46%)	4,409 (-54%)
2040	6,497 (-32%)	5,027 (-47%)	5,208 (-45%)	4,229 (-55%)
2050	7,758 (-18%)	6,826 (-28%)	6,830 (-28%)	5,999 (-37%)

Table 8:

LNV Component	Year DESC Adjusted Portfolio	Alt. Coal 2029	Alt. Coal 2031	Alt. Coal 2029 + ER
Total Variable	$ 898,958	$ 803,833	$ 813,819	$ 1,229,068
Total Fixed	$ 588,095	$ 549,894	$ 593,951	$ 590,452
Total New Build	$ 338,466	$ 437,857	$ 386,533	$ 426,560
Total LNPV	$ 1,825,519	$ 1,791,584 (-1.86%)	$ 1,794,303 (-1.71%)	$ 2,246,079 (+23%)

Note: The designation of column 1 in the original was DESC Preferred Plan which is not accurate since it includes the 10% bonus credit for energy community. It has been relabeled DESC Adjusted Portfolio.